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UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

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*Ex parte* SANTHANA KRISNAMACHARI

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Appeal 2007-3479  
Application 09/197,314<sup>1</sup>  
Technology Center 2600

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Decided: November 12, 2008

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Before KENNETH W. HAIRSTON, ROBERT E. NAPPI,  
and MARC S. HOFF, *Administrative Patent Judges*.

HOFF, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF CASE

Appellant appeals under 35 U.S.C. § 134 from a Final Rejection of claims 1-7, 9-20, 22-33, 35-40, and 42-47. We have jurisdiction under 35 U.S.C. § 6(b).

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<sup>1</sup> Application filed May 4, 1999. The real party in interest is Unisys Corporation.

We affirm-in-part.

Appellant's invention relates to a method and system for determining values of additional pixels for a reference frame of video based on pixels already in the reference frame and on pixels in one or more target frames of the video. By taking into account pixels from other frames when determining the values of the additional pixels, the invention provides a more accurate determination of the additional pixel values (Spec. 2).

Claims 1 and 42 are exemplary:

1. A method of increasing a resolution of at least a portion of a reference frame of video, the method comprising the steps of:

selecting a first block of pixels in the reference frame;

locating, in  $N$  ( $N \geq 1$ ) target frames, one or more blocks of pixels that substantially correspond to the first block of pixels, where the  $N$  target frames are separate from the reference frame;

determining values of additional pixels based on values of pixels in the first block and on values of pixels in the one or more blocks; and

adding the additional pixels among the pixels in the first block.

42. A television system which receives coded video data, and which forms images based on the coded video data, the television system comprising:

a decoder which decodes the video data to produce frame of video;

a processor which increases a resolution of a reference frame of the video based on pixels in the reference frame and based on pixels in at least one other target frame of the video; and

a display which displays an image based on the reference frame;

wherein the processor increases the resolution of the reference frame by selecting blocks of pixels in the reference frame and, for each selected block, (i) locating, in N ( $N \geq 1$ ) target frames, one or more blocks of pixels that substantially correspond to the first block of pixels, where the N target frames are separate from the reference frame; (ii) determining values of additional pixels based on values of pixels in the selected block and on values of pixels in the one or more blocks, and (iii) adding the additional pixels among the pixels in the selected block.

The prior art relied upon by the Examiner in rejecting the claims on appeal is:

Ueno	US 5,418,570	May 23, 1995
Yonemitsu	US 5,475,435	Dec. 12, 1995
Guetz	US 6,091,777	Jul. 18, 2000
Song	US 6,115,070	Sep. 5, 2000
Lempel	US 6,163,576	Dec. 19, 2000

Claims 1-6, 9-19, 22-26, 40, 45, and 46 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Ueno.

Claims 42 and 43 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Yonemitsu.

Claims 7 and 20 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Ueno in view of Guetz.

Claims 27-32, 35-39, and 47 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Ueno in view of Lempel.

Claim 33 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Ueno in view of Lempel and Guetz.

Claim 44 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Yonemitsu in view of Song.

Rather than repeat the arguments of Appellant or the Examiner, we make reference to the Appeal Brief (filed February 6, 2003) and the Examiner's Answer (mailed December 8, 2005) for their respective details.

### ISSUE

There are two principal issues in the appeal before us.

The first issue is whether the Examiner erred in finding that Ueno teaches increasing the resolution of at least a portion of a reference frame of video by determining values of additional pixels based on values of pixels in a first block (of pixels in a reference frame) and on values of pixels in the one or more blocks (in the target frame).

The second issue is whether the Examiner erred in finding that Yonemitsu teaches a processor which increases a resolution of a reference frame of a video based on pixels in the reference frame and based on pixels in at least one other target frame of the video.

### FINDINGS OF FACT

The following Findings of Fact (FF) are shown by a preponderance of the evidence.

#### *The Invention*

1. According to Appellant, the invention concerns a method and system for determining values of additional pixels for a reference frame of video based on pixels already in the reference frame and on pixels in one or more target frames of the video. By taking into account pixels from other frames when determining the values of the additional pixels, the invention

provides a more accurate determination of the additional pixel values (Spec. 2).

*Ueno*

2. Ueno teaches a motion picture coding apparatus which performs predictive coding on a high-resolution picture signal (col. 3, ll. 5-7).

3. Ueno teaches a system of producing a prediction picture from a low-resolution picture for odd lines and a prediction picture from a high-resolution picture for even lines (col. 8, ll. 61-64).

4. The input signal is separated into odd lines and even lines (col. 8, ll. 67-68).

5. Pixels at a position corresponding to the current coding block in the frame memory in the local decoder of the existing system are read out, and up-sampled by the up-sampling circuit (col. 9, ll. 3-6).

6. These pixels are alternately merged line by line to be a predictive signal (col. 9, ll. 6-8)

7. A predictive signal is produced by up-sampling a picture in the frame memory of the existing system (col. 9, ll. 8-10).

*Yonemitsu*

8. Yonemitsu teaches layer encoding and decoding of a non-interlace input image (col. 1, ll. 44-45).

*Lempel*

9. Lempel teaches a video encoder with reduced memory bandwidth requirements (col. 5, ll. 49-50).

*Song*

10. Song teaches using shared information in a macroblock for efficient conversion of inter-coded blocks to DCT inter-coded blocks based on DCT domain coefficients of anchor blocks and/or motion vector information (col. 7, ll. 13-17).

*Guetz*

11. Guetz teaches continuously adaptive digital video compression and decompression of multicast/multimedia information that includes color video and accompanying audio over packet switched networks and point-to-point communication circuits by means of compressed video and audio signal data streams that are layered to provide a base layer representing a base visual level and progressive additional data streams to provide higher levels of visual resolution (col. 5, ll. 44-54).

PRINCIPLES OF LAW

Anticipation is established when a single prior art reference discloses expressly or under the principles of inherency each and every limitation of the claimed invention. *Atlas Powder Co. v. IRECO, Inc.*, 190 F.3d 1342, 1347 (Fed. Cir. 1999); *In re Paulsen*, 30 F.3d 1475, 1478-79 (Fed. Cir. 1994).

Analysis of whether a claim is patentable over the prior art under 35 U.S.C. § 102 begins with a determination of the scope of the claim. We determine the scope of the claims in patent applications not solely on the basis of the claim language, but upon giving claims their broadest reasonable construction in light of the specification as it would be interpreted by one of ordinary skill in the art. *In re Am. Acad. of Sci. Tech. Ctr.*, 367 F.3d 1359,

1364 (Fed. Cir. 2004). The properly interpreted claim must then be compared with the prior art.

In an appeal from a rejection for anticipation, the Appellant must explain which limitations are not found in the reference. *See Gechter v. Davidson*, 116 F.3d 1454, 1460 (Fed. Cir. 1997) ("[W]e expect that the Board's anticipation analysis be conducted on a limitation by limitation basis, with specific fact findings for each *contested* limitation and satisfactory explanations for such findings.")(emphasis added). *See also In re Kahn*, 441 F.3d 977, 985-86 (Fed. Cir. 2006) ("On appeal to the Board, an applicant can overcome a rejection [under § 103] by showing insufficient evidence of *prima facie* obviousness or by rebutting the *prima facie* case with evidence of secondary indicia of nonobviousness.") (quoting *In re Rouffet*, 149 F.3d 1350, 1355 (Fed. Cir. 1998)).

"Section 103 forbids issuance of a patent when 'the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.'" *KSR Int'l Co. v. Teleflex Inc.*, 127 S. Ct. 1727, 1734 (2007). The question of obviousness is resolved on the basis of underlying factual determinations including (1) the scope and content of the prior art, (2) any differences between the claimed subject matter and the prior art, (3) the level of skill in the art, and (4) where in evidence, so-called secondary considerations. *Graham v. John Deere Co.*, 383 U.S. 1, 17-18 (1966). *See also KSR*, 127 S. Ct. at 1734 ("While the sequence of these questions might be reordered in any particular case, the [*Graham*] factors continue to define the inquiry that controls.")



In *KSR*, the Supreme Court emphasized “the need for caution in granting a patent based on the combination of elements found in the prior art,” *id.* at 1739, and discussed circumstances in which a patent might be determined to be obvious. In particular, the Supreme Court emphasized that “the principles laid down in *Graham* reaffirmed the ‘functional approach’ of *Hotchkiss*, 11 How. 248.” *KSR*, 127 S. Ct. at 1739 (citing *Graham v. John Deere Co.*, 383 U.S. 1, 12 (1966) (emphasis added)), and reaffirmed principles based on its precedent that “[t]he combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results.” *Id.* The Court explained:

When a work is available in one form of endeavor, design incentives and other market forces can prompt variations of it, either in the same field or a different one. If a person of ordinary skill can implement a predictable variation, § 103 likely bars its patentability. For the same reason, if a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond his or her skill.

*Id.* at 1740. The operative question in this “functional approach” is thus “whether the improvement is more than the predictable use of prior art elements according to their established functions.” *Id.*

## ANALYSIS

*Claims 1-6, 9-19, 22-26, 40, 45, and 46*

We select claim 1 as representative of this group, pursuant to our authority under 37 C.F.R. § 41.37(c)(1)(vii).

Appellant asserts error in the Examiner's rejection of claim 1 because Ueno does not teach “determining values of additional pixels based on values of pixels in the first block and on values of pixels in the one or more blocks” (Br. 5). According to Appellant, the upsampling circuit 35 relied upon by the Examiner does not perform the claimed function (Br. 6). Appellant further argues that Ueno's disclosure of vertical interpolation (col. 19, ll. 41-54) also fails to meet the claimed limitation, because “it is evident that individual fields are only being interpolated” (Br. 7).

We are not persuaded by Appellant's allegation that none of the sections of Ueno cited by the Examiner teaches determining values of additional pixels based on values of pixels in [a reference frame] and on values of pixels in one or more [target frames]. Ueno teaches a system of producing a prediction picture from a low-resolution picture for odd lines and a prediction picture from a high-resolution picture for even lines (FF 3). The input signal (*reference frame*) is separated into odd lines and even lines (FF 4). Pixels at a position corresponding to the current coding block in the frame memory in the local decoder of the existing system (*i.e., pixels in the one or more blocks in the target frames*) are read out, and up-sampled by the up-sampling circuit (FF 5). Finally, these pixels are alternately merged line by line (*i.e., the additional pixels are added among the pixels in the first block, as claimed*) to be a predictive signal (FF 6). A predictive signal is produced by up-sampling a picture in the frame memory of the existing system (FF 7).

We therefore find that Ueno does teach determining values of additional pixels based on values of pixels in a first block, and on values of pixels in one or more (other) blocks.

Because we find that Ueno teaches all of the elements of the invention recited in claim 1, we find no error in the Examiner's rejection of claim 1, nor that of claims 2-6, 9-19, 22-26, 40, 45, and 46 not separately argued, under 35 U.S.C. § 102.

*Claims 7 and 20*

Appellant presents no separate argument for the patentability of claims 7 and 20, dependent from claims 1 and 14, respectively. We therefore sustain the Examiner's rejection of claims 7 and 20 as being unpatentable under 35 U.S.C. § 103 over Ueno in view of Guetz, for the reasons expressed *supra* with respect to claim 1.

*Claims 27-32, 35-39, and 47*

Appellant presents no separate argument for the patentability of claims 27-32, 35-39, and 47. We therefore sustain the Examiner's rejection of claims 27-32, 35-39, and 47 as being unpatentable under 35 U.S.C. § 103 over Ueno in view of Lempel, for the reasons expressed *supra* with respect to claim 1.

*Claim 33*

Appellant presents no separate argument for the patentability of claim 33. We therefore sustain the Examiner's rejection of claim 33 as being unpatentable under 35 U.S.C. § 103 over Ueno in view of Lempel and Guetz, for the reasons expressed *supra* with respect to claim 1.

*Claims 42-44*

We select claim 42 as representative of this group, pursuant to our authority under 37 C.F.R. § 41.37(c)(1)(vii).

Appellant argues that Yonemitsu does not anticipate claim 42 because Yonemitsu fails to teach “a processor which increases the resolution of a

reference frame of the video based on pixels in the reference frame and based on pixels in at least one other target frame of the video” (Br. 8-9).

The Examiner asserts that Yonemitsu teaches such a processor, and refers the reader to columns 2, 3, 4, and 6-7 as allegedly supporting his position (Ans. 6). We have reviewed the cited columns of Yonemitsu as well, but cannot find such support. We have also reviewed the description of upsampling circuit 57, specifically relied upon by the Examiner (Ans. 5-6), but we do not find a teaching of increasing the resolution of a reference frame based on pixels in the reference frame and at least one other target frame, as claim 42 requires.

Because Yonemitsu does not teach every element of the claimed invention, we therefore find error in the Examiner’s rejection of claim 42, as well as claim 43 dependent therefrom, under 35 U.S.C. § 102. We further find error in the Examiner’s rejection of claim 44, dependent from claim 42 and not separately argued, as being unpatentable under 35 U.S.C. § 103 over Yonemitsu in view of Song.

#### CONCLUSION OF LAW

We conclude that Appellant has not shown that the Examiner erred in rejecting claims 1-7, 9-20, 22-33, 35-40, and 45-47. Claims 1-7, 9-20, 22-33, 35-40, and 45-47 are not patentable.

We further conclude that Appellant has shown that the Examiner erred in rejecting claims 42-44. On the record before us, claims 42-44 have not been shown to be unpatentable.

DECISION

The Examiner's rejection of claims 1-7, 9-20, 22-33, 35-40, and 45-47 is affirmed. The Examiner's rejection of claims 42-44 is reversed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv).

AFFIRMED-IN-PART

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